Somatic Cell and Molecular Genetics

Volume 13, 1987

Formerly *Somatic Cell Genetics*

EDITOR
Richard L. Davidson, University of Illinois College of Medicine, Chicago

ASSOCIATE EDITORS
Mario Capecchi, University of Utah, Salt Lake City
Yoshio Okada, Osaka University, Osaka
Frank H. Ruddle, Yale University, New Haven

EDITORIAL BOARD
Walter Bodmer, Imperial Cancer Research Fund Laboratories, London
Thomas Caskey, Baylor College of Medicine, Houston
Lawrence Chasin, Columbia University, New York
Franklin Costantini, Columbia University, New York
Gretchen Darlington, Baylor College of Medicine, Houston
Robert Fraley, Monsanto Company, St. Louis
Uta Francke, Yale University School of Medicine, New Haven
Dean Hamer, National Cancer Institute, Bethesda
Mary Harper, National Cancer Institute, Bethesda
Morgan Harris, University of California, Berkeley
Peter Howley, National Cancer Institute, Bethesda
Hilary Koprowski, The Wistar Institute, Philadelphia
John Littlefield, Johns Hopkins University School of Medicine, Baltimore
Barbara Migeon, Johns Hopkins University School of Medicine, Baltimore
Dusty Miller, Hutchinson Cancer Research Center, Seattle
Beatrice Mintz, Institute for Cancer Research, Philadelphia
Richard Mulligan, Massachusetts Institute of Technology, Boston
David Patterson, University of Colorado Medical Center, Denver
Theodore T. Puck, University of Colorado Medical Center, Denver
Walter Schaffner, Universitat Zurich, Switzerland
Matthew Scharff, Albert Einstein College of Medicine, Bronx
Immo Scheffler, University of California, San Diego
Thomas Shows, Roswell Park Memorial Institute, Buffalo
Louis Siminovich, University of Toronto, Toronto
Larry H. Thompson, University of California, Livermore

Somatic Cell and Molecular Genetics is published bimonthly by Plenum Publishing Corporation, 233 Spring Street, New York, N.Y. 10013. Subscription orders should be addressed to the publisher. *Somatic Cell and Molecular Genetics* is abstracted or indexed in Beck Medical Information, Biological Abstracts, Chemical Abstracts, Current Contents, Excerpta Medica, Index Medicus, International Abstracts of Biological Sciences, Referativnyi Zhurnal, and Science Citation Index.

© 1987 Plenum Publishing Corporation.

Somatic Cell and Molecular Genetics participates in the Copyright Clearance Center (CCC) Transactional Reporting Service. The appearance of a code line at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use. However, this consent is given on the condition that the copier pay the flat fee of $5.00 per copy per article (no additional per-page fees) directly to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, Massachusetts 01970, for all copying not explicitly permitted by Sections 107 or 108 of the U.S. Copyright Law. The CCC is a nonprofit clearinghouse for the payment of photocopying fees by libraries and other users registered with the CCC. Therefore, this consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, nor to the reprinting of figures, tables, and text excerpts. 0740-7750/87 $5.00

Subscription rates:

Volume 13, 1987 (6 issues) $225.00 (outside the U.S., $251.00). Price for individual subscribers certifying that the journal is for their personal use, $59.50 (outside the U.S., $68.50).

Volume 14, 1988 (6 issues) $250.00 (outside the U.S., $278.00). Price for individual subscribers certifying that the journal is for their personal use, $59.50 (outside the U.S., $68.50).

Second-class postage paid at New York, N.Y., and at additional mailing offices. Postmaster: Send address changes to *Somatic Cell and Molecular Genetics,* Plenum Publishing Corporation, 233 Spring Street, New York, N.Y. 10013.

Printed in the USA.

Somatic Cell and Molecular Genetics is published bimonthly by Plenum Publishing Corporation, 233 Spring Street, New York, N.Y. 10013. Subscription orders should be addressed to the publisher. *Somatic Cell and Molecular Genetics* is abstracted or indexed in Beck Medical Information, Biological Abstracts, Chemical Abstracts, Current Contents, Excerpta Medica, Index Medicus, International Abstracts of Biological Sciences, Referativnyi Zhurnal, and Science Citation Index. © 1987 Plenum Publishing Corporation. *Somatic Cell and Molecular Genetics* participates in the Copyright Clearance Center (CCC) Transactional Reporting Service. The appearance of a code line at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use. However, this consent is given on the condition that the copier pay the flat fee of $5.00 per copy per article (no additional per-page fees) directly to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, Massachusetts 01970, for all copying not explicitly permitted by Sections 107 or 108 of the U.S. Copyright Law. The CCC is a nonprofit clearinghouse for the payment of photocopying fees by libraries and other users registered with the CCC. Therefore, this consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, nor to the reprinting of figures, tables, and text excerpts. 0740-7750/87 $5.00

Somatic Cell and Molecular Genetics

Volume 13, Number 1 **January 1987**

CONTENTS

Karyotype Instability of Chinese Hamster Cells During In Vivo Tumor Progression 1
Marty F. Bartholdi, F. Andrew Ray, L. Scott Cram, and Paul M. Kraemer

Isolation and Characterization of Novobiocin-Resistant BHK Cells 11
Ryoji Ishida, Miwako Nishizawa, Katsuya Fukami, Ko Maekawa, Taijo Takahashi, and Takeharu Nishimoto

Dominant Mutation in Mouse Cells Associated with Resistance to Hoechst 33258 Dye, But Sensitivity to Ultraviolet Light and DNA Base-Damaging Compounds 21
Paul G. Debenham and Michael B. T. Webb

Complementation Between Glucocorticoid Receptor and Lymphocytolysis in Somatic Cell Hybrids of Two Glucocorticoid-Resistant Human Leukemic Clonal Cell Lines 33
Yeong-Seng Yuh and E. Brad Thompson

Analysis of Spontaneous Mutations in a Chromosomally Located HSV-1 Thymidine Kinase *(TK)* Gene in a Human Cell Line 47
Daphne R. Goring, Kalpana Gupta, and Michael S. DuBow

Delayed Mutation in Chinese Hamster Cells 57
Thomas Stamato, Ronald Weinstein, Bruce Peters, James Hu, Brian Doherty, and Amato Giaccia

Expression of Mouse Dihydrofolate Reductase Gene Confers Methotrexate Resistance in Transgenic Petunia Plants 67
David A. Eichholtz, Stephen G. Rogers, Robert B. Horsch, Harry J. Klee, Maria Hayford, Nancy L. Hoffmann, Sarah B. Braford, Cindy Fink, Jeff Flick, Keith M. O'Connell, and Robert T. Fraley

BRIEF COMMUNICATIONS

Three Functional Ribosomal Protein Genes Are Unlinked in Mouse Genome 77
Leanne M. Wiedemann, Peter D'Eustachio, Dawn E. Kelley, and Robert P. Perry

Human Gastrin-Releasing Peptide Gene Maps to Chromosome Band 18q21 81
Anne-Marie Lebacq-Verheyden, Virginia Bertness, Ilan Kirsch, Gregory F. Hollis, O. Wesley McBride, and James Battey

Human Gastrin-Releasing Peptide Gene Is Located on Chromosome 18 87
S. L. Naylor, A. Y. Sakaguchi, E. Spindel, and W. W. Chin

Assignment of Mouse Beta-Spectrin Gene to Chromosome 12 93
Pekka Laurila, Livia Cioe, Christine A. Kozak, and Peter J. Curtis

ERRATUM 99

Somatic Cell and Molecular Genetics

Volume 13, Number 2 **March 1987**

CONTENTS

Resistance to Toxic Effects of 5-Hydroxymethyl-2′-Deoxyuridine in Mammalian Cells 101
Elliot R. Kaufman

Effects of Bloom's Syndrome Fibroblasts on Genetic Recombination and Mutagenesis of Herpes Simplex Virus Type 1 111
Glenn J. Bubley and Lowell E. Schnipper

Chromosomal Location of Human Genes Encoding Major Heat-Shock Protein HSP70 119
Gail Singer Harrison, Harry A. Drabkin, Fa-Ten Kao, Judith Hartz, Iris M. Hart, Ernest H. Y. Chu, Barbara J. Wu, and Richard I. Morimoto

Glucocorticoid-Dependent Maturation of Viral Proteins in Mouse Lymphoma Cells: Isolation of Defective and Hormone-Independent Cell Variants 131
Sridhar K. Rabindran, Mark Danielsen, Gary L. Firestone, and Michael R. Stallcup

Selection for Phenylalanine Hydroxylase Activity in Cells Transformed with Recombinant Retroviruses 145
Fred D. Ledley, Tina Hahn, and Savio L. C. Woo

Altered Expression of Ribonucleotide Reductase and Role of M2 Gene Amplification in Hydroxyurea-Resistant Hamster, Mouse, Rat, and Human Cell Lines 155
Jim A. Wright, Tawfiq G. Alam, Grant A. McClarty, Aaron Y. Tagger, and Lars Thelander

Parasexual Analysis of Human Pepsinogen Molecular Heterogeneity 167
R. Thomas Taggart, T. K. Mohandas, and Graeme I. Bell

BRIEF COMMUNICATIONS

Regional Localization of Carbonic Anhydrase Genes ***CA1*** and ***CA3*** on Human Chromosome 8 173
Mary B. Davis, Lynne F. West, Jonathan H. Barlow, Peter H. W. Butterworth, Julie C. Lloyd, and Yvonne H. Edwards

Localization of UDP Glucuronosyltransferase Gene(s) on Mouse Chromosome 5 179
Donna Krasnewich, Christine A. Kozak, Daniel W. Nebert, and Peter I. Mackenzie

Somatic Cell and Molecular Genetics

Volume 13, Number 3 **May 1987**

CONTENTS

Correction of Deletions in Mammalian Cells by Gene Conversion 183
Jeffrey Rubnitz and Suresh Subramani

High-Frequency Reactivation of X-Linked Genes in Chinese Hamster X Human Hybrid Cells 191
Nathan Ellis, Elisabeth Keitges, Stanley M. Gartler, and Mariano Rocchi

Molecular Analysis of Immunoglobulin Expression in Variants of Murine B Lymphoma, 70Z/3 205
Reitha S. Weeks and Carol Hopkins Sibley

Gene for M1 Subunit of Ribonucleotide Reductase Is Amplified in Hydroxyurea-Resistant Hamster Cells 221
Joan M. Cocking, Patricia N. Tonin, Nancy M. Stokoe, Enrico J. Wensing, William H. Lewis, and P. R. Srinivasan

Molecular Analysis and Chromosomal Mapping of Amplified Genes Isolated from a Transformed Mouse 3T3 Cell Line 235
Linda Cahilly-Snyder, Teresa Yang-Feng, Uta Francke, and Donna L. George

Somatic Cell Hybridization of Roberts Syndrome and Normal Human Fibroblasts Transfected with Plasmids Carrying Dominant Selection Markers 245
J. L. Gunby, D. J. Tomkins, and P. L. Chang

Histochemical Staining of Clonal Mammalian Cell Lines Expressing *E. coli* β Galactosidase Indicates Heterogeneous Expression of the Bacterial Gene 253
Grant R. MacGregor, Ann E. Mogg, Julian F. Burke, and C. Thomas Caskey

BRIEF COMMUNICATIONS

A-raf Oncogene Localizes on Mouse X Chromosome to Region Some 10–17 Centimorgans Proximal to Hypoxanthine Phosphoribosyltransferase Gene 267
Philip Avner, Maja Bućan, Danielle Arnaud, Hans Lehrach, and Ulf Rapp

Chromosomal Assignments of Genes Coding for Human Leukocyte Common Antigen, T-200, and Lymphocyte Function-Associated Antigen 1, LFA-1 β Subunit 273
Yukihiro Akao, Kazuhiko R. Utsumi, Kazuyuki Naito, Ryuzo Ueda, Toshitada Takahashi, and Kazumasa Yamada

General Protocol for Microcell-Mediated Chromosome Transfer 279
Julie A. Sanford and Elton Stubblefield

Human Genes Encoding Prothrombin and Ceruloplasmin Map to 11p11-q12 and 3q21-24, Respectively 285
N. J. Royle, D. M. Irwin, M. L. Koschinsky, R. T. A. MacGillivray, and J. L. Hamerton

Somatic Cell and Molecular Genetics

Volume 13, Number 4 **July 1987**

CONTENTS

Analysis of Human Chromosome 11 by Somatic Cell Genetics: Reexamination of Derivatives of Human–Hamster Cell Line J1 293
Daniela S. Gerhard, Carol Jones, Helvise G. Morse, Barbara Handelin, Virginia Weeks, and David Housman

Sequential Expression in the Nervous System of C-*MYB* and *VIP* Genes, Located in Human Chromosomal Region 6q24 305
I. Gozes, H. Nakai, M. Byers, R. Avidor, Y. Weinstein, Y. Shani, and T. B. Shows

Human Interstitial Retinol-Binding Protein (IRBP): Cloning, Partial Sequence, and Chromosomal Localization 315
G. I. Liou, S.-L. Fong, J. Gosden, P. van Tuinen, D. H. Ledbetter, S. Christie, D. Rout, S. Bhattacharya, R. G. Cook, Y. Li, C. Wang, and C. D. B. Bridges

Cloned Mouse Lymphocytes Permit Analysis of Somatic Mutations That Occur In Vivo 325
Irene M. Jones, Karolyn Burkhart-Schultz, and Tawni L. Crippen

BRIEF COMMUNICATIONS

Mapping of *Lmyc* and *Nmyc* to Rat Chromosomes 5 and 6 335
Sigurdur Ingvarsson, Charlotte Asker, Zvi Wirschubsky, Josiane Szpirer, Göran Levan, George Klein, and Janos Sümegi

Fast-Twitch and Slow-Twitch/Cardiac Ca^{2+} ATPase Genes Map to Human Chromosomes 16 and 12 341
David H. MacLennan, Christopher J. Brandl, Shashikant Champaneria, Paul C. Holland, Vicki E. Powers, and Huntington F. Willard

Altered Form of Subunit 6 of Mitochondrial ATP Synthase Complex in Oligomycin-Resistant Mutants of Chinese Hamster Ovary Cells 347
Priscilla L. Holmans and Gail A. M. Breen

Hemopexin Is Localized to Human Chromosome 11 355
Susan L. Naylor, Fiorella Altruda, Angus Marshall, Lorenzo Silengo, and Barbara H. Bowman

CONFERENCE PROCEEDINGS: THE NEXT 25 YEARS IN HUMAN GENETICS

INTRODUCTION 359
Theodore T. Puck and Richard L. Davidson

HUMAN GENE MAPPING

Polymorphic DNA Markers on the Human Genomic Map: Signposts for Localization of Unknown Genes 361
Ray White

Genetic Mapping in Chromosome 21 and Its Implications for Down's Syndrome and Other Diseases 365
David Patterson

Genetic Mapping of Human Chromosome 11: Use of Human Cell Surface Antigens 373
Carol Jones

Chromosome Microdissection and Microcloning in Human Molecular Genetics 375
Fa-Ten Kao

Molecular Analysis of Human Repetitive Sequence Family and Its Use as Genetic Marker 381
Martha Liao Law, Yisheng Xu, Ralph Berger, and Lin Tung

Computational Tools for Using and Analyzing DNA Sequences 391
Walter B. Goad

Multiple Recurrent Genomic Rearrangements and Fragile Sites in Human Cancer 397
Jorge J. Yunis

GENETIC CHANGE BY MEANS OF MUTATION, GENE TRANSFER, AND RECOMBINATION

Mutation in Mammalian Cells: Theory and Implications 405
Theodore T. Puck and Charles A. Waldren

Steps Toward Experimental Measurement of Total Mutations Relevant to Human Disease 411
C. A. Waldren and T. T. Puck

Chromosomally Integrated Shuttle Vectors and Molecular Analysis of Mutagenesis in Mammalian Cells 415
Richard L. Davidson and Charles R. Ashman

Detecting Sequence Changes in a Gene 419
Leonard S. Lerman

Adult Mammalian Hepatocyte as Target Cell for Retroviral Gene Transfer: A Model for Gene Therapy 423
Jon A. Wolff, Jiing-Kuan Yee, Hal Skelly, Jane Moores, James Respess, Theodore Friedmann, and Hyam Leffert

Overview of Human Cells in Genetic Research: Altered Phenotypes in Human Cells Caused by Transferred Genes 429
Douglas E. Brash, George E. Mark, Michael P. Farrell, and Curtis C. Harris

Insertion of Dominant Selectable Markers into the Human Genome 441
David Housman

Gene Replacement by Homologous Recombination in Mammalian Cells 447
Raju Kucherlapati

REGULATION OF GROWTH AND DEVELOPMENT

Genetic Regulation of Growth Control: Role of Cyclic AMP and Cell Cytoskeleton 451
Theodore T. Puck

Regulation of Cell Proliferation by Oncogene Products and Growth Factors 459
Raymond L. Erikson

Ordered Disposition of Parental Genomes and Individual Chromosomes in Reconstructed Plant Nuclei, and Their Implications 463
Michael D. Bennett

Developmental Genetics: New Approaches and Opportunities 467
Frank Ruddle

SOME GENETIC APPLICATIONS TO MEDICINE

Progress in Understanding Mechanisms of the Serum Cholesterol Risk Factor in Atherosclerosis 469
Charles von Gunten, John Leighton, Dennis Peffley, and Michael Sinensky

Candidate for Inherited Neurobiological Dysfunction in Schizophrenia 479
Robert Freedman, Lawrence E. Adler, Neil Baker, Merilyne Waldo, and Gail Mizner

Genetics and the Future of Medicine 485
Arthur Robinson

Somatic Cell and Molecular Genetics

Volume 13, Number 5 **September 1987**

CONTENTS

Polyadenylation of Chinese Hamster Dihydrofolate Reductase Genomic Genes and Minigenes After Gene Transfer 491
Lee Venolia, Gail Urlaub, and Lawrence A. Chasin

Isolation and Characterization of a Glycine Transport Mutant in an Established Mammalian Cell Line, CHO(PEOT/1) 505
Margaret Fairgrieve, James M. Mullin, Anne H. Dantzig, Carolyn W. Slayman, and Edward A. Adelberg

Regulation of Cytochrome P-450c in Differentiated and Dedifferentiated Rat Hepatoma Cells: Role of the *Ah* Receptor 513
Jean M. Gudas and Oliver Hankinson

Characterization of Mouse Nuclear and Mitochondrial Mutants with Increased Resistance to Cytochrome *b* Inhibitors 529
Neil Howell and M. S. Nalty

Identification of Nucleotide-Excision-Repair Genes on Human Chromosomes 2 and 13 by Functional Complementation in Hamster–Human Hybrids 539
L. H. Thompson, A. V. Carrano, K. Sato, E. P. Salazar, B. F. White, S. A. Stewart, J. L. Minkler, and M. J. Siciliano

Molecular Cloning of MER-2, a Human Chromosome-11-Encoded Red Blood Cell Antigen, Using Linkage of Cotransfected Markers 553
Jerome Bill, Ed Palmer, and Carol Jones

DNA Base Sequence Changes Induced by Ethyl Methanesulfonate in a Chromosomally Integrated Shuttle Vector Gene in Mouse Cells 563
Charles R. Ashman and Richard L. Davidson

BRIEF COMMUNICATIONS

Physical and Genetic Localization of Quinonoid Dihydropteridine Reductase Gene (*QDPR*) on Short Arm of Chromosome 4 569
Marcy E. MacDonald, Mary Anne Anderson, Jean L. Lockyer, Sheldon Milstien, Wendy J. Hobbs, Anne G. Faryniarz, Seymour Kaufman, Fred D. Ledley, Savio L. C. Woo, and James F. Gusella

Assignment of Human Tryptophan Hydroxylase Locus to Chromosome 11: Gene Duplication and Translocation in Evolution of Aromatic Amino Acid Hydroxylases 575
Fred D. Ledley, Hernan E. Grenett, David P. Bartos, Peter van Tuinen, David H. Ledbetter, and Savio L. C. Woo

Chromosomal Assignments of Genes for Tissue Plasminogen Activator and Urokinase in Mouse 581
Bhanu Rajput, Angus Marshall, Ann M. Killary, Peter A. Lalley, Susan L. Naylor, Dominique Belin, Richard J. Rickles, and Sidney Strickland

Somatic Cell and Molecular Genetics

Volume 13, Number 6 **November 1987**

CONTENTS

Growth Suppression of Hybrids Between Transformed Cells and Normal Fibroblasts in Serum-Free Medium: Correlation with Retention of Human Chromosomes 587
Daniel S. Straus and T. Mohandas

The Role of Acentric Chromosome Fragments in Gene Amplification 597
Peter Hahn, William F. Morgan, and Robert B. Painter

Cloning and Characterization of DNA Sequences Amplified in Multidrug-Resistant Djungarian Hamster and Mouse Cells 609
A. V. Gudkov, O. B. Chernova, A. R. Kazarov, and B. P. Kopnin

Correction of Excision Repair in Xeroderma Pigmentosum by Hamster Chromosome Fragments Involves Both Classes of Pyrimidine Dimers 621
Deneb Karentz, David Mitchell, and James E. Cleaver

Selection and Characterization of Mycophenolic Acid-Resistant Leukemia Cells 627
Marvin B. Cohen

Activation of Human α_1-Antitrypsin Genes in Rat Hepatoma × Human Fibroblast Hybrid Cell Lines Is Correlated with Demethylation 635
David E. Barton and Uta Francke

Cyclic AMP-Resistant Mutants of S49 Mouse Lymphoma Cells Hemizygous for Expression of Regulatory Subunit of Type I Cyclic AMP-Dependent Protein Kinase 645
Robert A. Steinberg, Caroline S. Murphy, Joanne L. Russell, and Karen B. Gorman

Overlapping Transcription Units in the Transient Receptor Potential Locus of *Drosophila melanogaster* 661
Fulton Wong, Zhao-tong Yuh, Eugene L. Schaefer, Barbara C. Roop, and Abdul H. Ally

Regional Localization of the Murine Duchenne Muscular Dystrophy Gene on the Mouse X Chromosome 671
Jeffrey S. Chamberlain, Stephen G. Grant, Alice A. Reeves, Linda J. Mullins, Dennis A. Stephenson, Eric P. Hoffman, Anthony P. Monaco, Louis M. Kunkel, C. Thomas Caskey, and Verne M. Chapman

BRIEF COMMUNICATIONS

Human Gene Coding for Granulocyte-Colony Stimulating Factor Is Assigned to the q21-q22 Region of Chromosome 17 679
Naotoshi Kanda, Shin-ichi Fukushige, Tomoaki Murotsu, Michihiro C. Yoshida, Masayuki Tsuchiya, Shigetaka Asano, Yoshito Kaziro, and Shigekazu Nagata

Regional Localization of the Gene Coding for Sphigolipid Activator Protein SAP-1 on Human Chromosome 10 685
Fa-Ten Kao, Martha Lia Law, Judith Hartz, Carol Jones, Xun-Ling Zhang, Nazneen Dewji, John S. O'Brien, and David A. Wenger

Assignment of the Lactotransferrin Gene to Human Chromosome 3 and to Mouse Chromosome 9 689
Christina T. Teng, Brian T. Pentecost, Angus Marshall, Amy Solomon, Barbara H. Bowman, Peter A. Lalley, and Susan L. Naylor

AUTHOR INDEX TO VOLUME 13 695

SUBJECT INDEX TO VOLUME 13 699